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Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the interactive fault map.

Horseshoe fault zone, Hell Canyon section (Class A) No. 946a

Last Review Date: 1996-09-23

Compiled in cooperation with the Arizona Geological Survey

citation for this record: **Pearthree, P.A., compiler, 1996, Fault number 946a, Horseshoe fault zone, Hell Canyon section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 12/14/2020 03:13 PM.**

Synopsis	**General:** Fault consists of two sections, both of which have evidence of recurrent late Quaternary activity. The north-trending Hell Canyon section is about 12 km long and follows the boundary between a steep, linear mountain front to the west and a late Cenozoic sedimentary basin to the east. The west-northwest-trending Horseshoe Reservoir section is about 10 km long and roughly parallels the southern margin of the sedimentary basin. Part of this section is usually submerged beneath Horseshoe Reservoir. Detailed surficial geologic mapping and profiling of scarps along the Hell Canyon section indicate that upper to

	middle Pleistocene alluvium is faulted; the youngest event may be about 15-30 ka, but there probably was an earlier event post-150 ka. Trenches excavated across the Horseshoe Reservoir section indicate that middle Quaternary Verde River terrace gravels have been displaced a total of about 2 m in 2 or 3 events. The youngest event is about 10-20 ka (similar to that of the Hell Canyon section); one or two older events occurred between 100-300 ka (Piety and Anderson, 1990 #2142; 1991 #2143). **Sections:** This fault has 2 sections. Sections are defined based on orientation and geomorphic expression (Piety and Anderson, 1990 #2142; 1991 #2143).
Name comments	**General:** Initially identified and called the Tangle Peak fault by Ertec (1981 #2141); renamed the Horseshoe Dam fault by Menges and Pearthree (1983 #2073). Also called the Horseshoe fault by Pearthree and Scarborough (1984 #2137) and Piety and Anderson (1990 #2142). **Section:** Named by Piety and Anderson (1990 #2142).
County(s) and State(s)	MARICOPA COUNTY, ARIZONA YAVAPAI COUNTY, ARIZONA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. *Comments:* Location based on detailed mapping at 1:48,000 by Piety and Anderson (1990 #2142), transferred to 1:250,00-scale topographic base map.
Geologic setting	Located in the Transition Zone, the upland portion of the Basin and Range province in central Arizona. This normal fault defines the western and southern margins of the small, dissected Horseshoe basin between the Mazatzal Mountains and Humboldt Mountain. The basin is probably an asymmetric graben, with the Horseshoe fault being the master fault. The mountain front associated with the Horseshoe fault is fairly high and steep and quite linear; the basin has been deeply dissected in response to downcutting of the Verde River, which flows through it.
Length (km)	This section is 12 km of a total fault length of 19 km.

Average strike	N8°W (for section) versus N25°W (for whole fault)
Sense of movement	Normal *Comments:* Inferred from down-to-basin topographic expression of fault scarps, location of fault zone along bedrock-basin-fill contact, and regional relations.
Dip Direction	E
Paleoseismology studies	
Geomorphic expression	Fault scarps are formed on alluvial-fan deposits and at the bedrock-alluvium contact on this section. Alluvial scarps are well preserved, ranging in height from 2 to 7.5 m and having maximum slopes of 11? to 27? degrees; morphologic analysis suggests the youngest rupture occurred 15 to 30 ka.
Age of faulted surficial deposits	Middle to Upper Pleistocene. Based on soil development and topographic relations.
Historic earthquake	
Most recent prehistoric deformation	late Quaternary (<130 ka) *Comments:* Time of youngest movement is 15-30 ka based on morphologic fault-scarp analysis.
Recurrence interval	*Comments:* Recurrence intervals are unknown but could be quite long based on inference of two events in past 150 k.y.
Slip-rate category	Less than 0.2 mm/yr *Comments:* Low slip-rate category assigned based on less than 5 m of vertical displacement in past 150 k.y.
Date and Compiler(s)	1996 Philip A. Pearthree, Arizona Geological Survey
References	#2141 Ertec, 1981, Seismotectonic study, Horseshoe Dam, Arizona: Report prepared for Water and Power Services, U.S. Bureau of Reclamation, Denver, Colorado, 37 p.

	#2073 Menges, C.M., and Pearthree, P.A., 1983, Map of neotectonic (latest Pliocene-Quaternary) deformation in Arizona: Arizona Geological Survey Open-File Report 83-22, 48 p., scale 1:500,000. #2137 Pearthree, P.A., and Scarborough, R.B., 1984, Reconnaissance analysis of possible Quaternary faulting in central Arizona: Arizona Bureau of Geology and Mineral Technology Open-File Report 85-4, 75 p., scale 1:250,000. #2142 Piety, L.A., and Anderson, L.W., 1990, Seismotectonic investigation for Horseshoe and Bartlett Dams, Salt River Project, Arizona: Bureau of Reclamation Seismotectonic Report 90-7, 59 p. #2143 Piety, L.A., and Anderson, L.W., 1991, The Horseshoe fault—Evidence for prehistoric surface-rupturing earthquakes in central Arizona: Arizona Geology, v. 21, no. 3, p. 1, 4-8.